

Construction of a Compact Submersible Aquatic Light Trap

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Abstract.—Instructions are provided for the assembly of a two funnel submersible light trap. This qualitative sampler can be used for collecting a broad range of photophic macroinvertebrates from both lentic and lotic habitats. The body and funnels are constructed from plastic to prevent corrosion and breakage.

Over the years there have been nearly as many aquatic light trap designs as there are entomologists who use them in the field. Each of these is a variation of the basic design consisting of a light, a funnel trap and a power source. All were found to have their little foibles. They were either too large to be carried into the field in great numbers or the trap portion was made of glass and easily broken. Traps made from glass or other transparent material wasted much of their energy by the insects being attracted to the sides of the jar rather than being directed into the funnel.

The trap described below is compact, durable and efficient over a broad spectrum of neustonic invertebrates which are attracted to light.

Suggestions for improvements were made by the many people who field tested this trap, especially Clifford Kitayama who helped from the time of its inception through the final design.

CONSTRUCTION

The body (item 1, list of materials) is made from a 4 in. I.D., $\frac{1}{4}$ in. wall, polyvinylchloride pipe cut into 8 in. lengths. A $1\frac{1}{8}$ in. hole is drilled through the side of the pipe, at an equal distance from each end. Four $\frac{1}{16}$ in. holes are drilled, two into each end, at 90° to the $1\frac{1}{8}$ in. hole and $\frac{1}{2}$ in. number 4 pan head screws (item 2) are inserted. A combination square with a center finding head aids in aligning the holes prior to drilling (Fig. 1).

The 4 in. kitchen funnels (item 3) are notched at opposite sides on the lip at 45° and 135° to the tab that is used to hang it on a cup hook. Squeeze-type paper punch pliers were used to make these hemispherical notches. If an 8 oz. Lustraware funnel manufactured by Borden is used, there are four equally spaced lines molded into the funnel which simplify centering of the notches. Cut off the small end of the funnel to prevent the ends from touching the light when the unit is assembled (Fig. 2). The amount removed is at the discretion of the builder. The larger the hole, the larger the insect that will be admitted. The funnels are installed by aligning the notches with the screws and rotating the lip of the funnel under the inner side of the head of the screw so that there is a slight resistance of the lip to the under side of the head of the screw when rotating the funnel (Fig. 3).

The light is constructed by soldering a 3 volt, 6 volt or 12 volt light bulb (item

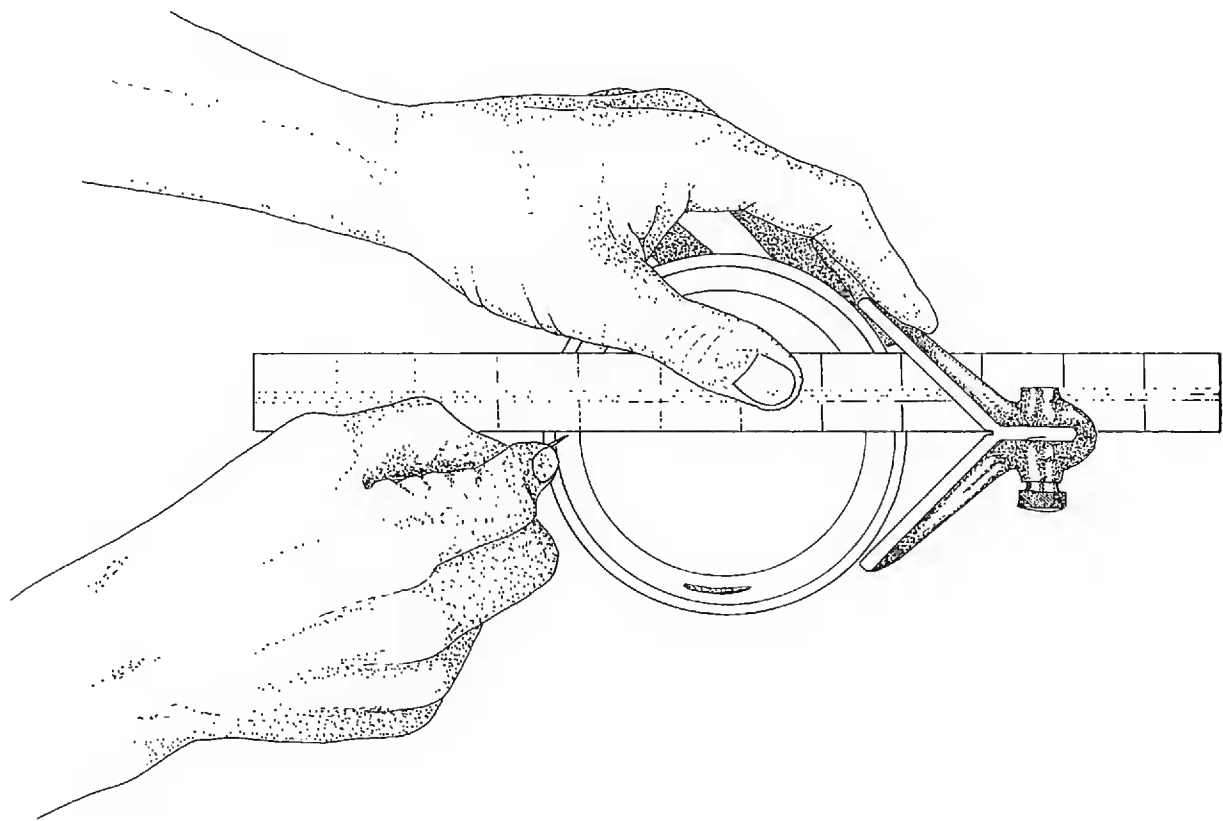


Figure 1. A center finding head is used to locate positions for drilling $\frac{1}{16}$ in. holes.

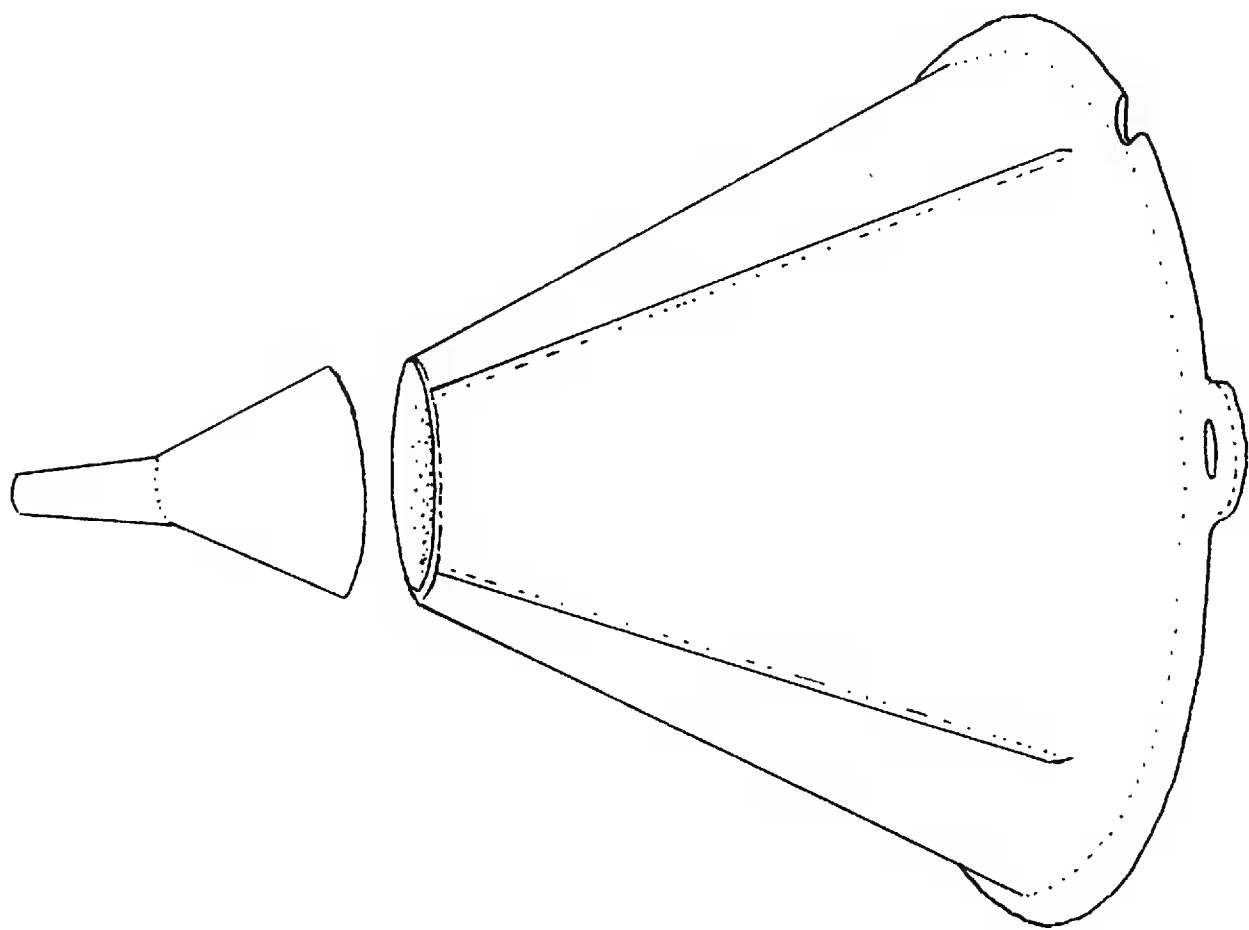


Figure 2. Cut off the end of the funnel to produce the desired size hole.

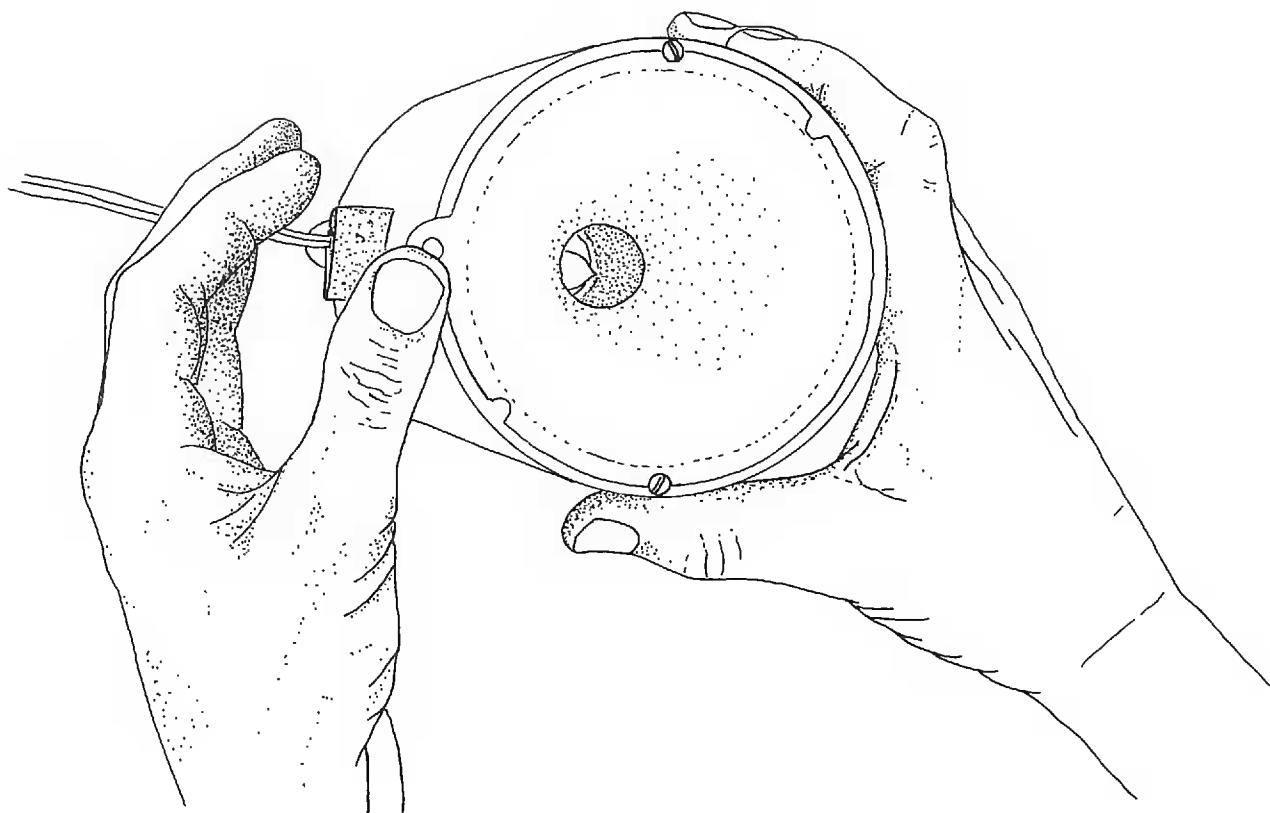


Figure 3. Align the hemispherical notches with the two screws, then rotate the lip of the funnel under the heads of the screws.

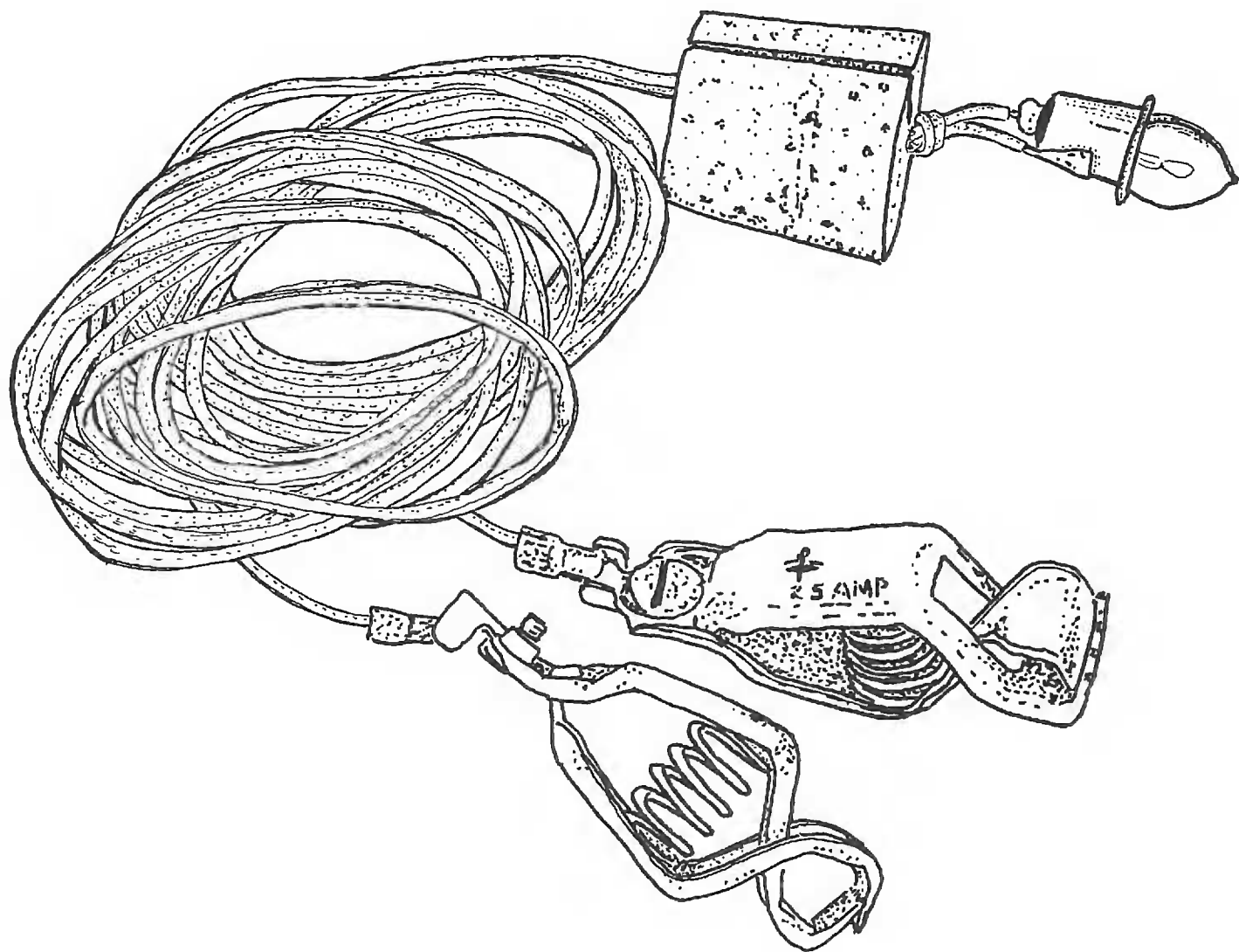


Figure 4. Assembled light for use with 12-volt auto battery.

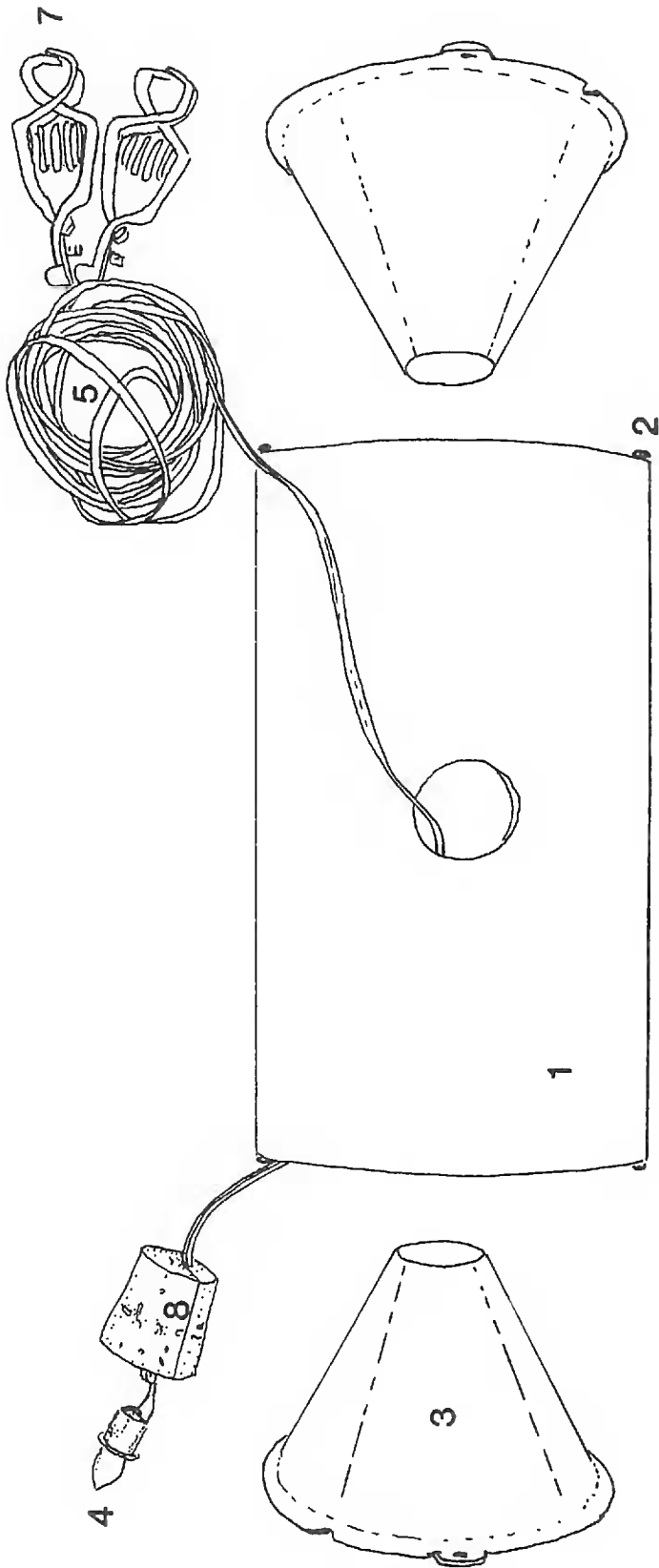


Figure 5. Exploded view of completed light trap.

4) to the end of a 22 gauge 2-strand wire (item 5). A 7 m (20 ft) length of wire is convenient, but the length may be varied to meet different requirements. Cut the end of the wire that is soldered to the center of the light bulb slightly shorter than the wire that is soldered to the side of the bulb (Fig. 4). This will relieve strain and prolong the life of the wires. The free ends of the wires are stripped and a $\frac{3}{16}$ in. lug (item 6) can be crimped or soldered to the end of the wires. This allows the lug to be used directly on a 6 volt lantern battery with screw posts. If charging clips (item 7) are attached to the wires they can be connected to a 6 volt spring-type battery or to a 12 volt automotive battery. If rechargeable D-cells are used with a 3 volt light, hook four batteries in parallel sets of two. This will prevent the batteries from becoming too greatly discharged if they are allowed to run all night. Cut a number 6 cork (item 8) longitudinally halfway through with a saw. Tie a knot in the wire at the base of the light bulb and insert the wire into the cut in the cork with the knot towards the larger end of the cork. Remove the funnels from the pipe body and thread the wire through the $1\frac{1}{8}$ in. hole from the inside. The cork stopper is tightened into the hole by pulling on the wire. If you wish to attach the funnels to the trap so as not to lose them, tie a double knot in the wire about six inches from the light and attach a piece of cord to the tab on one of the funnels and run the cord through the loop in the wire and attach the free end of the line to the tab on the other funnel.

DISCUSSION

This trap was found to be a rugged versatile unit that is extremely efficient in lentic and slow lotic water. Simple modifications are possible for different situations. To allow entry of crawling insects a piece of waterproof contact sandpaper is attached to the entire lower surface of the funnel. Cut the sandpaper slightly longer than the lip of the funnel so that it comes in contact with the substrate.

This trap is more dense than water and sinks. To collect on the surface, attach pieces of styrofoam to the trap with waterproof tape. Conversely, collecting at a given height from the bottom can be achieved with a weight and a desired length of tether. Variations in the design are larger or smaller diameter pipe and corresponding funnels. A three inch trap can easily be backpacked into the most inaccessible high mountain lakes leaving ample room in the pack for a fishing pole.

Do not leave the trap unattended for more than about thirty minutes until it is apparent what is being collected. If not removed frequently, the more voracious predators will leave you with few good specimens. The trap must also be emptied just before daylight to prevent the insects from being lured out by the light entering through the holes in the funnels.

On several occasions swarms of aquatic insects could be seen swimming around the trap but only a few were found inside the trap when emptied. Closer examination showed the insects were being eaten by the fish as rapidly as they were approaching the funnel openings. In situations where extreme fish predation occurred, a 3 ft \times 3 ft \times 3 ft, five-sided cage made of $\frac{1}{2}$ in. hardware screen was placed over the trap.

LIST OF MATERIALS (Fig. 5)

1. (1) 4 in. inside diameter \times $\frac{1}{4}$ in. wall polyvinylchloride pipe, 8 in. long.
2. (4) $\frac{1}{2}$ in. number 4 pan head tapping screw, type AB.
3. (2) 4 in. kitchen funnel, 8 oz.
4. (1) 3 volt, 6 volt or 12 volt light bulb.
5. (7 m (20 ft)) 22 gauge two-strand wire.
6. (2) $\frac{3}{16}$ in. lug, size 22-18 gauge.
7. (2) charging clips, 25 amp.
8. (1) number 6 cork.

PUBLICATIONS RECEIVED AND BRIEFLY REVIEWED

A Revision of the Subfamily Coelidiinae (Homoptera: Cicadellidae). V. New tribes Hikangiini, Youngolidiini, and Gabritini. By M. W. Nielson. Pacific Insects Monograph, No. 40, 78 pp., 252 figs. 1983 (issued prior to 13 September 1983, at which time a notice was mailed by editor correcting an error on the subtitle on the front cover—not to read “IV. Coelidiini”). Published and distributed by Bishop Museum Press, P.O. Box 19000-A, Honolulu, Hawaii 96817, USA. Price \$16.50 paperbound. ISSN 0078-7515.

The abstract states:

This paper is the 5th and last part of a worldwide revision of the subfamily Coelidiinae. The first 4 parts covered the tribes Tinobregmini, Sandersellini, and Tharrini (Part 1), Thagriini (Part 2), Teruliini (Part 3), and Coelidiini (Part 4). Three new tribes, Hikangiini, Youngolidiini, and Gabritini, are described. A revised key to all of the known tribes is given to show a more reasonable phylogenetic relationship than has been presented heretofore. Keys, descriptions, and illustrations are provided for 41 species in 8 genera. Two genera and 6 species are treated in the tribe Hikangiini, all from the Ethiopian Region. Five genera, 2 from the Ethiopian Region and 3 from the Neotropical Region, with 31 species are elucidated in the tribe Youngolidiini. In the tribe Gabritini, 1 genus and 4 species are treated. A separate checklist, with synonyms, is given for the genera and species of each tribe.

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